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July 12, 1958

VOL. 74 NO. 2 PAGES 17-32

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Antarctic Depths

See Page 27

A SCIENCE SERVICE PUBLICATION

Kodak reports on:

sugar in the lacquer, but first esterified . . . how to get started right, or even wrong . . . a run of luck in the optical design department

SAIB

SAIB has a viscosity of 100,000 cps at 86°F. Add 10% ethyl alcohol, making *SAIB-90*, and the viscosity drops to 700 cps. Any of the commercial lacquer solvents thins it similarly.

SAIB's heat stability is high, its volatility is low (BP > 550°F). This translates into lacquers of much higher non-volatile content at equal application consistencies. The customer has to pay for the solvent, but only the non-volatiles remain behind to cover his surfaces for him.

SAIB is compatible with most resins, plasticizers, oils, and waxes. Half resin—half plasticizer, it can be used to soften or to harden. A coating in which *SAIB* has replaced nitrocellulose to the extent of 40% is harder than the unmodified nitrocellulose coating. On the other hand, a typical *SAIB*-modified cloth lacquer showed good flexibility as cold as −6°F. At the hot end, 168 hours at 220°F drove off 1% of *SAIB*, compared with 17% of the familiar 50% castor oil—50% DOP plasticizer combination in a corresponding formulation containing 10 parts plasticizer.

SAIB stands for *s*ucrose *a*cetate *iso*butyrate. What a tangled web of modern economics these three deadpan words conceal! Obesity becomes a national worry. The public eats less sugar than the sugar industry would like. Concurrently, industrial alcohol becomes cheaper to synthesize than to ferment from sugar. Along come we, the very people who take oil refinery by-product olefins and make from them *Tecsol Ethyl Alcohol* as well as n-butyraldehyde for *Tenite Butyrate Plastics* and photographic film. It happens we also get quite a bit of isobutyraldehyde to dispose of. So we convert some of it to isobutyric anhydride, make acetic anhydride from some of our ethyl alcohol, and invent a way to esterify sucrose with these anhydrides. Sucrose for the first time becomes something to build upon rather than chop up. It builds into a most durable molecule, studded with solubilizing groups, packing high molecular weight (847) with commercially unparalleled compactness. Thus, *SAIB* and bright prospects for sugar men, coatings men, householders, and us.

For data on SAIB *without the heart throb, write Eastman Chemical Products, Inc., Kingsport, Tenn. (Subsidiary of Eastman Kodak Company).*

Special sensitized products

A poor, proud, and gentle old man was once arrested for helping himself out at infrequent intervals over a long period of years by printing a few crude one dollar bills with which to buy food. When his story was made public, it was learned that upon discovering his interest in the graphic arts he had written to us and received basic information on which he had built his modest skill.

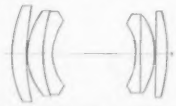
By reading our circulars a person can no more acquire proficiency in counterfeiting than he can in autoradiography of tissue sections, spectrography, astrophysical research, or investigations with nuclear track emulsions. Nevertheless, as long as intentions are legal, it doesn't hurt early in the game to obtain from us the essential facts about the specialized photographic materials we manufacture for these purposes.

New sheets entitled "Kodak Sensitized Materials for Autoradiography," "Kodak Spectrum Analysis Plates and Films and Kodak 'Spectroscopic' Plates and Films," and "Kodak Nuclear Track Materials" are obtainable without charge from Eastman Kodak Company, Special Sensitized Products Division, Rochester 4, N. Y. He who asks for all three impresses us with the scope of his ambitions but strains our credulity a mite.

Four sharp eyes

After all these years—the recent ones with high-speed digital computers helping—it surprises outsiders that lens designers should still expect to find new combinations of curvatures, refractive indices, thicknesses, and spacings that will substantially improve photographic lens performance. But they do, to the pain of the authors of yesteryear's superlatives. A sort of continuous auction goes on, at which optical manufacturers keep bidding up the number of lines per millimeter resolved on film in accordance with Method 7 of MIL-STD-150.

In 6-inch to 12-inch focal lengths for 70mm aerial film at relative apertures around *f*/2.8 to *f*/3.5, we revel for the moment in beating the previous high by nearly twice. We have had a run of good luck in recent months. We did it with our 6-inch *f*/2.8 *Kodak Aero Ektar Lens,*



Formula M-360. Here are the minimum resolution figures we get at full aperture for a sample lens of this formula photographing high-contrast, 3-line, clear-on-black resolution targets on Kodak Super-XX Aerial Recon Film with white light through a Kodak Wratten No. 12 Filter:

semi-field	0°	2.5°	5°	7.5°	10°	12.5°	15°
lines/mm	56	56	63	62	49	38	33

These figures are very close to what used to be quoted for the capabilities of the film itself. Only nowadays our film people smile at the conceptual *naiveté* of a resolving power figure for film. Only the resolving power of the film-lens combination retains some significance. This significance, too, tends to attenuate after an hour at the blackboard with an earnest man.

There are three other Kodak Aero Ektar Lenses in this class. They are all manufactured on contract, not stocked for off-the-shelf sale. They are not cheap. They are comparatively heavy. Distortion, though moderate, exceeds cartographic limits. Above all else, the driving force behind these lenses is to reduce the need for large size in aerial cameras. Only organizations whose interest is commercial or professional need inquire. They should address themselves to Eastman Kodak Company, Military and Special Products Sales, Rochester 4, N. Y.

Kodak
TRADE MARK

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

PHYSICS

"Crazy" Particles Studied

Physicists are attempting to find some order among the many different characteristics of the 21 elementary particles known to exist in atomic cores.

➤ CRAZY, mixed-up particles having unpredictable properties and behavior patterns are found in atomic cores.

To try to bring order out of this chaos, some 250 scientists from 26 nations gathered to open the 1958 Annual International Conference on High Energy Physics meeting in Geneva. It was the first time this meeting, considered the most important yearly event for nuclear physicists, had been held in Europe.

The European Organization for Nuclear Research, or CERN as it is called from its initials in French, sponsored the meeting. CERN, Europe's atomic research center run jointly by a dozen countries, is building one of the world's largest particle accelerators. It will speed up protons to energies of 25 billion electron volts.

Among the world-famed physicists that attended the conference were Dr. J. R. Oppenheimer, director of the Institute for Advanced Study, Princeton, N. J., last year's Nobel Prize winners in physics, Drs. C. N. Yang and T. D. Lee, also of the Institute; Prof. W. Heisenberg of Germany, whose basic equation tying together all elementary particles was much discussed; Prof. Leprince Ringuet of France; Prof. E. Amaldi of Italy; Prof. Hideki Yukawa of Japan; Prof. E. Scherrer and Prof. W. Pauli of Switzerland; Sir John Cockcroft and Prof. P. M. S. Blackett of the United Kingdom, and the Russian physicists, E. I. Tamm, S. Ia. Nikitin, Ia. A. Smorodinsky and L. D. Landau.

The meetings emphasized the most recent findings about nuclear particles by both theoretical and experimental scientists. The problems of what atomic cores are made of and how they are held together are attacked by the theoretical specialists using information garnered by the experimentalists.

There is at present no satisfactory theory of elementary particles. There are now some 21 known to exist. A few have lifetimes measured in billionths of a second. One of them, the neutron that triggers the atomic bomb, lives approximately 15 minutes.

Scientists Probe Matter

➤ THE PROPERTIES of matter at very low temperatures, some 459 degrees below zero Fahrenheit, are being probed by scientists around the world.

Their studies are directed at a better understanding of how atoms are held together but they may also yield new and cheaper methods for transmitting electric power.

Helium is the only substance that remains liquid under ordinary pressure at temperatures near absolute zero. All others freeze to the solid state when cooled sufficiently low. The discovery that helium remains liquid at extremely low temperatures was made by Kamerlingh Onnes of the University of Leiden on July 10, 1908.

At ordinary temperatures, the random heat motion of atoms and molecules masks the quantum behavior of the individual particles, and matter behaves in its familiar way. Helium, however, because it remains liquid near absolute zero, has strange properties and behaves in unfamiliar ways.

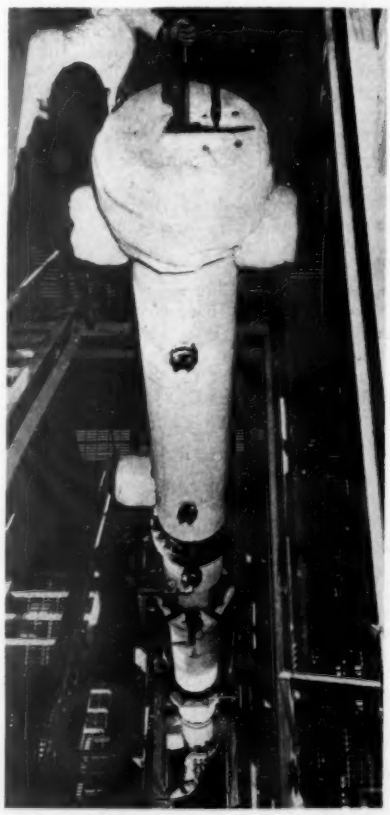
Its properties can be understood only in terms of quantum mechanics, the peculiar system of laws that govern behavior of matter on an ultra-microscopic scale, the world of individual atoms and molecules. In liquid helium, matter displays quantum properties on a bulk scale.

Demonstrations of its quantum effects are striking. An electric current, once started, continues seemingly indefinitely. This is known as superconductivity and was also discovered by Onnes. If liquid helium is poured into a flask separated into two chambers by a partition, the two levels quickly become equal. This is due to its lack of viscosity and is known as superfluidity.

One form of the material, liquid helium four, conducts heat about 1,000 times better than copper at room temperature.

At the University of Leiden, in the Netherlands, scientists commemorated the 50th anniversary of the discovery of liquefied helium by a week-long international meeting.

Science News Letter, July 12, 1958



CONTROL ROD—A prototype control rod drive for the projected nuclear power plant, the Commonwealth Edison Dresden Station near Chicago, is undergoing tests in a 50-foot simulated reactor vessel at the General Electric atomic power equipment department.

GEOPHYSICS

Satellites Show Earth Not So Flat as Thought

➤ THE WORLD is only as flat as the Russians have thought.

A preliminary report on the oblateness or flatness of the earth has been released by Col. F. O. Diercks, commanding officer of the U. S. Army Map Service, Washington, D. C. and Dr. John A. O'Keefe, chief of Research and Analysis.

The report is based on data gathered from the orbits of artificial satellites 1958 alpha, the Explorer, and 1958 beta 2, the first Vanguard satellite launched by the U. S.

Scientists have long known that, technically, the earth is "an oblate spheroid, slightly flattened at the poles." The amount of this flatness is measured in terms of how much shorter the radius of the earth is at the poles than at a point on the equator. The internationally accepted figure has been 1/297; that is, the polar radius of the earth is shorter by 1/297, or about 13 miles, than the equatorial radius. This amounts to a difference of about one-third of one percent.

However, the late Dr. F. N. Krassovsky, a Russian geodecist, arrived at the figure of 1/298.3 in 1942, asserting that the polar areas were not quite so flat as our scientists had thought.

A recent study by Dr. H. G. Hertz and Marvin Marchant of the Research and Analysis Branch of the Army Map Service from radio measurements of the Vanguard and Explorer satellites, results in the figure 1/298.38, proving that the Russians were right all along.

Dr. Krassovsky arrived at his conclusions through gravity measurements and triangulation procedures. The current study, although preliminary in nature, tends to support the Russian figures, and agrees with a similar investigation begun earlier by Smithsonian Astrophysical Observatory physicist Dr. L. G. Jacchia.

"Because of its height, the Vanguard was the best thing in the sky for geodetic purposes," Dr. O'Keefe said, "and the Explorer was next."

Science News Letter, July 12, 1958

MEDICINE

Vasopressors Save Heart By Conserving Blood

➤ THE LIFE-SAVING vasopressor drugs, used to combat shock after a heart attack, conserve the blood supply to heart and brain at the expense of other less sensitive organs in the body.

This has been demonstrated in research by Drs. Eliot Corday, John Williams, Lauro de Vera and Herbert Gold of the University of California at Los Angeles Medical School.

The group reported on their research to the American College of Chest Physicians meeting in San Francisco.

Blood flow to the heart, brain, kidneys and liver during shock and following administration of vasopressor drugs was studied. It was found that with restoration of blood pressure following drug administration, heart blood flow increased 500%. Blood flow to the brain increased in a similar manner.

Sudden restoration of blood pressure reduced kidney blood flow to even lower levels than those during shock. This may account for kidney damage occasionally found in patients treated with vasopressor drugs, the doctors said. However, with a gradual restoration of blood pressure kidney flow improved somewhat.

The liver has a double blood supply, the investigators pointed out, 1. an arterial one rich in oxygen and 2. a venous one with reduced oxygen. During shock, blood flow to the liver is so low that damage is sure to occur. When blood pressure is restored only one of the systems, the arterial one, functions. However, the rich oxygen supply compensates for decreased blood flow.

The role of the drugs seems to be to conserve heart and brain blood supply during severe stress when the heart can only pump sufficiently to supply nourishment to these two vital organs. The heart and brain can withstand oxygen starvation for only a few minutes. The liver and kidney can go much longer without oxygen.

Science News Letter, July 12, 1958

GEOPHYSICS

Sputnik I's Rocket Pieces Are in Russia's Backyard

➤ THE PIECES of sputnik I's rocket are somewhere in Russia's backyard, Drs. R. Jastrow and I. Harris of the U. S. Naval Research Laboratory report.

The report, appearing in *Science* (June 27), contradicts both official and unofficial Russian claims that sputnik I's rocket was strewn over Alaska and the western coast of Canada and the United States. It also refutes the statement made by Nikita Khrushchev in early December 1957 that the carrier rocket plunged to earth over American territory but "the Americans will not give it up to us."

New calculations of the rocket's last passage and its fall, made by Drs. Jastrow and Harris, indicate that it probably hit the earth in Outer Mongolia, although some of its fragments may have been scattered as far as China and even in the Soviet Union itself.

The Navy scientists estimate that the rocket, known officially as 1957 Alpha 1, fell on Dec. 1, 1957, at 8:46 a.m. Greenwich mean time, approximately eight hours after the last radar observation made on it in the United States.

The final observation was made from Malvern, England, at 8:28. At the time of that last observation, the rocket had an altitude of only 71 miles and was in its final dive. The NRL scientists believe that the rocket continued on past Malvern for 64 degrees in the plane of the orbit before it struck the earth.

After it passed over Malvern, the rocket probably disintegrated into fragments with differing drag coefficient and these fragments were doubtless strewn over a wide area.

Science News Letter, July 12, 1958

ICHTHYOLOGY

Government Scientists Study Oyster Problems

➤ STARFISH and oyster drills are giving the oyster fisherman stiff competition. These sea creatures go along with human beings in finding the oyster a tasty morsel. Unfortunately, they have a head start by being at the scene, at the oyster bed.

Right now research is being pushed to discover ways of controlling or eliminating oyster predators.

Scientists have already discovered oyster drills will not cross over copper-trimmed fences. The reason for this is unknown, but one such fence will be put around a half-acre plot in Chincoteague Bay off the Maryland-Virginia boundary this year to see how effective it is in protecting the oyster beds.

At the Bureau of Commercial Fisheries Laboratory at Milford, Conn., scientists are searching for a selective poison that will kill the oyster drill yet not injure the oysters or other valuable sea life.

While the drills are a year-round problem, much oyster research is directed at finding why in some years the starfish population soars to ten times the normal number.

At the same time scientists are investigating this biological question, they are working on ways to control starfish. Granulated unslaked lime has been successful in destroying them.

Other problems besides predators face the oyster industry, however.

Current studies include ways of ending the scarcity of seed oysters. Salt water ponds, fresh water is deadly poison to the oyster, on Martha's Vineyard, an island off Massachusetts, offer good sites for this study. The unexplained mortality in 1957 of some 40% to 95% of the oysters in beds along the New Jersey side of Delaware Bay is also being investigated.

The Federal Government, through the U. S. Fish and Wildlife Service's Bureau of Commercial Fisheries, is responsible for much of the current oyster research.

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PUBLIC SAFETY

Information Program On Nuclear Accidents

➤ STATE AND local government officials across the country are being briefed by Atomic Energy Commission experts on how to handle radiation incidents in their areas.

Although highly unlikely, it is possible an accident involving a nuclear reactor or radioactive materials could release hazardous amounts of radioactivity. If such a radiation incident occurs, local officials may seek advice and assistance from the nearest AEC office or the nearest military installation.

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PUBLIC HEALTH

Own Fluoridation Possible

A method of supplying fluoridated water that is reported to be safe and reliable has been developed for use in an individual's private water system.

➤ FLUORIDATED water can be supplied to the 60,000,000 persons in the United States who are served by private water systems such as wells.

The method for doing this consists of either a hydraulic or solenoid-actuated installation that feeds a fluoride solution into the water supply.

Such a method has been developed and has been used during the past two years in four homes in a suburban area of Maryland. Each of these homes is served by individual wells, approximately three inches in diameter, delivering between three and nine gallons of water per minute by means of a jet pump.

During one four-month period of operation, the analysis of four samples of water tested showed a maximum variation of only .02 milligram of fluoride per liter of water, Franz J. Maier, sanitary engineer, division of dental public health, Public Health Service, U. S. Department of Health, Education and Welfare, reports in the *American Journal of Public Health* (June).

Experience with such a feeder device indicates a satisfactory fluoride level can be achieved in home water systems if the installations are properly maintained and adjusted periodically.

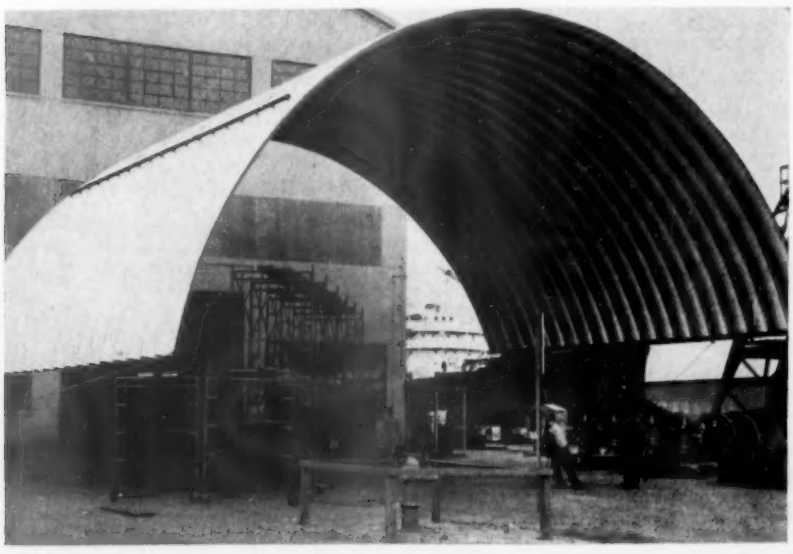
A service group might be organized to provide fluoridated water in this manner to owners of private water supplies, he suggested. To do this, a servicing organization similar to those now providing chlorinated water, softened water or bottled water would supply and maintain the fluoridation equipment and be responsible for the entire installation. Estimated costs for such a service per month is approximately $3.00, depending upon the number of customers and their location, Mr. Maier said.

At the present time, the most widely used method of fluoridation for the group unable to receive fluoridated water is the direct application of fluoride solution on children's teeth by dentists or hygienists. The cost is considerably more than the fluoridation of water supplies.

Bottled fluoridated water has also been suggested, but the cost, like that of dental application, is very high.

Fluoride pills have been used, but unsuccessfully. The persistent, constant and prolonged effort required by parents to provide the pills for their children has proven unsatisfactory. Likewise, other methods, such as fluoridated food, milk, and salt, have evolved into far more problems than the fluoridation of water supplies, Mr. Maier said.

Science News Letter, July 12, 1958



***PRE-FAB SHELTER**—Prefabricated steel buildings, manufactured by the Wonder Building Corporation of America, Chicago, can be used to shelter workers. Their trussless design makes possible space-saving stacking for storage.*

● RADIO

Saturday, July 19, 1958, 1:30-1:45 p.m., EDT
"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Maurice M. Shapiro, superintendent of the nucleonics division and head of the cosmic ray branch, Naval Research Laboratory, Washington, D. C., will discuss "High Energy Radiation."

MEDICAL

Study Prenatal Factors In Childhood Cancers

➤ THREE PRE-BIRTH events occurred at a significantly higher rate to children who later died of malignancies, or cancers, than to living children.

The three events are direct irradiation during the fetal stage, before birth, virus infections and threatened abortion, Dr. Alice Stewart, Josefine Webb and David Hewitt, all of the department of social medicine, Oxford University, report in the *British Medical Journal* (June 28).

One other prenatal influence, excessive maternal age, appears to increase the risk of leukemia in childhood and be related to the fact that this disease and mongolism tend to occur together, they said.

The experimental group, studied through reports made by the mothers, consisted of 1,416 children, 677 leukemia, 739 other cancers. Controls were children born at the same time and place and of the same sex as the children who died of malignancy.

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SOCIOLOGY

Marriage and Education Both More Popular

➤ THE PROPORTION of Americans who are married has increased more since 1940 than in any other comparable period.

And they are not quitting school to get married. By 1957, the number of persons with at least a full high school education was twice as large as it was in 1940. This trend toward marriage and more education is reported to the *American Sociological Review* (June) by Drs. Paul C. Glick of the U. S. Bureau of the Census and Hugh Carter of the National Office of Vital Statistics.

Women need no longer choose between a career and marriage, they found. In the fall of 1956, one of every four college students was married.

Men who marry and continue to live with their wives have more education and income, on the average, than those with broken marriages or those who remain bachelors.

The story is quite different with women, however. The single women are those with the most education and income.

Men who are making a very good living tend to have more education, a high marriage rate, an above-average age at marriage and a low divorce rate.

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ROCKETS AND MISSILES

Moon May Be Exploded

➤ THE FIRST rocket to the moon may trigger a gigantic explosion of powerful lunar chemicals.

The first exploratory missile to hit the moon may obliterate itself and a part of the moon's surface in a major explosion, a noted physicist reports.

Even if a space ship could manage to land without triggering a violent reaction, there is a good chance that the first spaceman might cause an explosion when he sets foot on moon dust that may be so chemically unstable that its slightest contact with a foreign substance will cause it to react with explosive force.

That is the view of Prof. John R. Platt, department of physics, University of Chicago, who believes the otherwise barren surface of the moon is coated with a highly reactive cosmic "dust" consisting in large part of unstable free chemical radicals, frozen out of action against the moon's extremely cold surface. These "unfinished compounds" probably are formed from carbon, nitrogen and oxygen.

He supports his report in *Science* (June 27) with references to recent work of five authorities on the chemistry and physics of outer space whose published views of the moon's make-up are similar to his own.

Prof. Platt called for a program of study, to be conducted in earth laboratories, that would determine accurately the composition of the moon's surface.

Such information is needed, he said, so we can devise "a number of precautions for early moon missiles."

"The first man who plants a rubber boot on a lunar surface may be in for an unpleasant surprise," he said, adding "surfaces of such a chemically unstable character" could be extremely reactive and extensive heat-liberating explosions "might be easily triggered."

The "intersteller dust particles" that Dr. Platt believes coat the moon are free radicals, unstable molecular fragments eager to react violently with other materials to complete stable molecular structures.

A foreign substance, such as rubber on a boot heel or plastics on a missile, could easily trigger the reaction just as rubber and other organic substances set off explosions when merely touched to unstable rocket fuels and oxidizers.

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TECHNOLOGY

"Buck Rogers" Coming

➤ MAN SOON will be flying free as a bird, with the aid of nothing more than small rockets strapped to him.

That is a major goal of "project grasshopper" which recently resulted in a demonstration of the Buck Rogers personal rocket.

The goal can be achieved in about two years from the time the Army states a requirement for the unique rocket and lets a contract for its formal development, Harry W. Burdett Jr., head of the advanced design group at Reaction Motors Division of Thiokol Chemical Corporation, Denville, N. J., told SCIENCE SERVICE.

Army officials said they are "evaluating" existing and planned models of the Buck Rogers which Mr. Burdett said already permitted even non-athletic soldiers to run faster, jump higher and farther than the greatest athletes the world has even known.

Besides greater combat mobility, the "ultimate" Buck Rogers also will provide personal transportation up to several miles. It is possible that the rocket may even permit scouts to fly over enemy territory, spot installations and movements and return with a report.

Since it is hoped to make the device small, light, cheap and simple enough for general issue to all troops, the engineers believe the Buck Rogers may even find applications in a civilian market.

Alexander H. Bohr, Reaction Motors project engineer who actually put into practice a concept originated in 1940 by Lt. Col. Charles M. Parkin Jr., Army Corps of Engineers, said new models soon will be revealed which operate on rocket fuels rather than by compressed gases.

The device revealed by action films to the Infantry Board May 29 at Fort Benning, Ga., consisted of a waist belt and harness to which were attached several small canisters of compressed nitrogen and two exhaust jets or nozzles.

The model permitted a soldier to run for several seconds at 35 miles per hour without tiring and jump about six feet vertically.

The engineers said their immediate goal is to utilize chemical fuels in a Buck Rogers device that permits a man to run faster, longer and jump higher and farther. It would give infantry troops greater combat mobility.

The ultimate goal, which the engineers are confident can be accomplished with about two years' work, is to make the device a "true flying belt just like that worn by the comic strip character."

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PSYCHIATRY

Find Mental Disturbance In Very Young Infants

➤ SIGNS OF mental disturbance have been observed in infants as young as six weeks of age.

But for reliable information about such early abnormalities the doctor cannot depend entirely on reports from the mother, Dr. Sylvia Brody of Lenox Hill Hospital, New York, says in a report to the *American Journal of Orthopsychiatry* (April).

Two infants showing such signs of mental disturbance are described by Dr. Brody. Because the unusual behavior was observed so early and proper handling instituted right away, the infants recovered.

One of the babies wanted to sleep too much, the other stayed awake and cried all day long.

The first baby, six weeks old, had a mother who was so quiet that she actually was lulling the baby to sleep with her gentleness. The baby would go to sleep instead of nursing even though the mother jiggled him and slapped his feet.

The mother in this case was instructed to look at the baby's face more and to talk to him or sing when he was about to nurse. Within two days normal feeding was restored.

In the case of the other infant, a three-month-old, the mother was too anxious about him, picking him up and holding him or rocking him every time he whimpered.

This mother was instructed to stabilize her own routine and little by little to accustom the baby to lying quiet in his crib. This baby's behavior also changed. It took a few weeks before he could sleep quietly through a whole night and could be alone for intervals during the day.

"I believe," Dr. Brody commented, "that the number of such small and early problems that occur, and go untreated, and grow worse as they get enmeshed with subsequent developmental conflicts, is very great."

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ENGINEERING

Frenchman Combines Diesel With Turbine

➤ A COMBINATION diesel and gas turbine engine was reported at the oil and gas power conference of the American Society of Mechanical Engineers meeting in Philadelphia, by Auguste F. Moiroux, of La Societe, L'Etudes Mecaniques et Energetiques of Paris.

Mr. Moiroux described the latest French development as a "free piston gasifier," in which diesel fuel is burned in a cylinder and the resulting energy drives opposed reciprocating free pistons. The pistons, in turn generate compressed air which drives a gas turbine.

The principal advantage claimed is the ability of the device to use low-grade fuels more efficiently because of the high compression ratio of the diesel system.

Mr. Moiroux predicted this could lead to the more economical use of petroleum resources and better utilization of existing engineering know-how. He also asserted the problems involved in the building of such engines have already been worked out by diesel designers.

The term "free-piston" describes a system wherein there is no direct connection with the drive shaft.

Science News Letter, July 12, 1958

PUBLIC HEALTH

Check-ups for Health

➤ PRESCRIPTION for the executive: Have a periodic emotional check-up.

Take time to review your past and evaluate your present in the light of your goals, particularly in your family relationships. Schedule vacations and hobby time. Improve your ability as a leader, not just on the job but at home and in the community. Understand yourself better, especially how you handle your hostile feelings.

This prescription was issued by an outstanding psychiatrist, Dr. William C. Menninger of the Menninger Foundation, Topeka, Kans. Dr. Menninger recommends that companies provide regular emotional check-ups for their executives. These are times, he points out in the *Menninger Quarterly* (June), that exact a heavy toll from these men and women, so that jokes are told about one-, two-, and three-ulcer executives.

The periodic emotional check-up, in place of pulse and blood pressure, should reveal how well the executive is able to get along with his associates. Is he a prima donna? How frequently do his bad days occur?

What happens when things are at their worst? Does he lose his temper? Does he get jittery? Does he become so anxious he cannot function?

Is he able to find release for his anxieties and tensions outside of his business life? All of us are upset at times when the pressure mounts, but if one is chronically tense and anxious and unable to find relief for his distress, he is emotionally sick.

The executive should take vacations. They are good for his mental health. The man who boasts he has not had a vacation in five years betrays poor judgment rather than virtue.

He is being unfair to his family and perhaps also to his business.

Both at the office and at home, the executive must be prepared to delegate responsibility—he must know when to act authoritatively and when to share the making of decisions with others, be willing to listen as well as to speak out.

The executive must stand ready to give to the community as much of himself as he can afford, not just his money, but himself.

"One of the ingredients in my prescription," says Dr. Menninger, "is for the executive to have 'a mission'—beyond the job, beyond himself—in which he believes and which will make his part of the world a bit better for his being in it."

Science News Letter, July 12, 1958

TECHNOLOGY

New Soles for Navy Shoes Outlast Old Ones by 50%

➤ LEATHER SOLES impregnated with butyl rubber and resins promise longer-wearing, water-resistant shoes for Navy men and civilians alike.

Shoes strengthened by the new development in sole leather have been wear-tested for more than three years, the Department of the Navy's Bureau of Supplies and Accounts has reported. The impregnated sole leather outlasts conventional soles by 50%.

This development, Navy officials believe, represents the "most forward step in sole leather technology during the past half century."

Use of the leather, which is vegetable tanned, is expected to cause savings in shoe costs, less frequent shoe repairs, decreased production time and less reliance on imported tannins, previously considered an essential in leather making.

Now being produced commercially by major sole leather tanneries, much of the new leather is being used to make children's shoes.

The sole leather was developed by the National Bureau of Standards in cooperation with the Navy.

Science News Letter, July 12, 1958

MEDICINE

Bureau of Mines Produces Chromium Cancer Fighter

➤ CANCER-FIGHTING radioactive "bullets" have been developed by Bureau of Mines scientists.

The "bullets," designed to be either "shot" or implanted into cancerous tissue, are small metal cylinders cut from fine strands of high-purity chromium wire produced only at the Bureau's Northwest Electrodevelopment Laboratory, Albany, Ore. They measure a tenth of an inch in length and are a thirtieth of an inch in diameter.

The chromium bullets are exposed to neutrons in a nuclear reactor and made radioactive so they emit gamma rays in the manner of radium.

The radioactive chromium-51 cancer-fighter has been used in animal experiments. Results of work by Dr. William G. Myers of the Ohio State University Health Center indicate that it may prove valuable in treating cancers in humans.

Science News Letter, July 12, 1958

ENGINEERING

Outer Space Simulated In Pitch-Black Tunnel

➤ A PITCH-BLACK tunnel, seemingly 300 miles long, is Raytheon Manufacturing Company's newest contribution to the nation's defense planning.

Used in infrared ray detection experiments, the tunnel actually is composed of three tunnels, each 100 feet long, 8-feet wide and 8 feet high. By means of mirrors and a light "minifier," targets are made to appear as much as 300 miles out in darkest space.

For best results, tunnel experiments are conducted in pitch blackness and at a controlled cool temperature. Special black, reflection-free paint is used, and constant checks are made for light leaks. The tunnel air-conditioner could handle five normal homes.

Dust filters keep optical surfaces clear of contamination.

Ability of infrared search rays, invisible to the human eye, to seek out targets at long distances is expected to make a major contribution to various defense programs, Raytheon officials said.

Science News Letter, July 12, 1958

INFRARED RAYS SHED LIGHT—Targets like the model plane suspended at the end of the pitch-black test tunnel are illuminated and detected with invisible infrared rays at the Raytheon Manufacturing Company's laboratories.

MEDICINE

Four-Way Vaccine Adds Polio Antigen to DPT Shot

➤ A FOUR-IN-ONE immunization shot, offering protection against childhood's major diseases, has proven to be successful in trial tests.

The new vaccine protects children against polio, as well as whooping cough, diphtheria and tetanus, the three diseases for which pediatricians administer DPT vaccine.

The vaccine, known as Quadrigen, was developed by Parke, Davis & Company. It is not yet commercially available.

The four components of the vaccine are concentrated and provide effectiveness with three doses of one-half cubic centimeter (just over eight drops) of Quadrigen for each inoculation.

Children who participated in a preliminary test of the vaccine ranged in age from two and one-half months to five years.

As a result, it was found that the incidence of naturally acquired resistance to polio is low in seven- to nine-month-old infants. This low incidence indicates a need for vaccine inoculation prior to this age, the investigators report.

Injections of the vaccine produced good antibody response to the polio component, as well as to the other three antigens in the new vaccine in children from two and one-half months to five years of age. A fourth dose was found to be desirable for children younger than four months.

Three Detroit Health Department physicians, Drs. Joseph G. Molner, health commissioner; C. D. Barrett Jr., director of maternal and child health; and C. P. Anderson, deputy commissioner of health, medical service, conducted the trial in conjunction with Drs. E. A. Timm, B. I. Wilner, H. E. Carnes and I. W. McLean Jr., members of the Parke-Davis research staff. They collaborated to write a report on results of the test which appears in the *Journal of the American Medical Association* (June 28).

Science News Letter, July 12, 1958

MEDICINE

Plans to Control Leprosy In the Americas Discussed

➤ PLANS FOR a full-scale attack to control the spread of leprosy throughout the Americas were discussed at a seminar in Brazil.

The attack will be initiated by an exchange of treatment techniques and new drug results among 44 public health officials from 16 countries and territories in the Americas, Dr. Fred L. Soper, director of the Pan American Sanitary Bureau, regional office of the World Health Organization, said.

The estimated number of leprosy cases throughout the world is between 3,000,000 and 10,000,000. The number in Africa alone is estimated at 2,300,000 by Dr. F. J. C. Cambournac, WHO regional director for Africa.

In the Americas it is an important public health problem for a number of the countries and territories.

At present, four states, Texas, Louisiana, California and New York, lead the United States in number of reported cases of leprosy.

South of the border numerous cases make leprosy a very important health problem.

Dr. Edgar B. Johnwick, medical officer in charge of the world-famous leprosarium run by the U. S. Public Health Service in Carville, La., Dr. Fred Kluth, director of the division of training of the Texas State department of health, in Austin, Tex., and Dr. James A. Doull, noted leprosy expert of the Leonard Wood Memorial, represented the United States at the seminar which lasted from June 30 through July 7.

There were also participants from Argentina, Brazil, British Guiana, Colombia, Cuba, French Guiana, Jamaica, Martinique, Mexico, Paraguay, Peru, Surinam, Trinidad, Uruguay and Venezuela.

Science News Letter, July 12, 1958

MEDICINE

Problem Child Aided By New Drug

➤ A NEW anti-depressant drug has been developed for the "problem" child.

The drug, called Deaner, seems to aid the progress of social adaptation and scholastic functioning for children with behavior problems, results of a recent study indicate.

Most of the 108 children in the study were overactive, overirritable, had a short attention span, and were doing poorly scholastically. All of the children had behavior problems severe enough to make them socially unacceptable. Also, as a group, they were emotionally unstable, unpredictable and unadaptable. Their ages ranged from six months to 20 years.

The drug proved beneficial in 68% of the group studied. The children had taken the drug from four weeks to nine months. Those children who benefited from the drug began to act in more socially accepted patterns and learning in school improved, according to Dr. Leon Oettinger Jr. of the department of electroencephalography, St. Luke's Hospital, Pasadena, Calif. Dr. Oettinger conducted the bulk of the clinical studies and presented his results before the American Encephalographic Society meeting in Atlantic City, N. J.

At least ten children responded with excellent results, he said. Several children showed definite improvement in all school subjects within a single grading period, usually six weeks. In many cases, the ease and speed of reading was greatly increased.

For most patients, Dr. Oettinger noted, Deaner appeared to be superior to meprobamate, captodiamine, phenothiazine, reserpine and other agents previously used.

In addition, the use of the drug did not inhibit the attention of the child by creating drowsiness. Deaner is a para-acetamidobenzoic acid salt of 2-dimethylaminoethanol, sold only by prescription.

Deaner is manufactured by Riker Laboratories of Los Angeles.

Science News Letter, July 12, 1958

IN SCIENC

OCEANOGRAPHY

Ocean "River" Mapped Below Equatorial Current

➤ A NEW SWIFT-FLOWING "river" as strong as 1,000 Mississippis has been measured hidden in the depths of the South Pacific Ocean.

Speeding along three times as fast as the surface current, the south equatorial current, this new river flows eastward along the equator for at least 3,500 miles. Scientists have mapped its dimensions and found that it is some 250 miles wide and 1,000 feet deep.

"This is one of the great oceanographic discoveries of our time," Dr. Roger Revelle, director of the University of California's Scripps Institution of Oceanography, La Jolla, Calif. said.

Scripps scientists working in cooperation with the U. S. Fish and Wildlife Service's Pacific Oceanic Fishery Investigations recently spent almost two months at the equator studying the undercurrent. Tests and measurements of the direction, flow and other characteristics of the new subsurface current were made from the research vessels Horizon and Hugh M. Smith.

So far the current has been measured only half-way across the ocean.

Oceanographers believe it is probably an important mechanism for making the equatorial waters one of the most fertile fishing grounds in the world.

The current was actually first discovered in 1952 by the late Townsend Cromwell, a Fish and Wildlife scientist who was investigating fishing methods. In his honor, John A. Knauss, scientific leader aboard the Horizon, hopes the new current will be named the Cromwell Current.

Science News Letter, July 12, 1958

ASTRONOMY

Age May Not Be Cause Of Difference in Galaxies

➤ GALAXIES in the universe may vary in their development due to differences not yet understood instead of differences in age, a University of Chicago astronomer has reported.

While there may be age differences between two galaxies, it is possible that the evolutionary progress of the stars in different galaxies proceeds at differing rates, William W. Morgan, professor of astronomy at Chicago's Yerkes Observatory located at Williams Bay, Wis., said.

All galaxies may be the same age, but evolving at various rates for reasons not yet understood, such as the proportions of elements of which their stars are composed, he told scientists at the American Astronomical Society meeting in Madison, Wis.

Science News Letter, July 12, 1958

ICE FIELDS

ASTRONOMY

Discover Sun Spotted With Minute Sunspots

➤ THE SUN is dotted with tiny, stable sunspots, Dr. J. D. Bahng of the Princeton University Observatory told the American Astronomical Society meeting in Madison, Wis.

The minute dark spots, called pores, were seen on high-resolution solar photographs taken from the stratosphere. In one series of time-sequence photographs lasting 47 minutes there was no noticeable change in the tiny sunspots' appearance.

This has led Dr. Bahng to conclude the pores are extremely stable. He also contrasted them with granules, mysterious turbulences on the face of the sun, some of which measure 500 miles wide.

The average lifetime of the granules, seen on the same series of solar photographs, was found to be of the order of five minutes.

The stability of the pores, Dr. Bahng concluded, suggests that they have no direct connection with the granulation taking place on the surface of the sun.

It also lends support, he said, to an earlier view that the pores are indeed extremely small sunspots.

Science News Letter, July 12, 1958

MEDICINE

Brain-Blood Barrier May Impede Help of Drugs

➤ MANY of the drugs used in the treatment of brain tumors and inflammations in the nervous system may be impeded by a brain-blood barrier.

Many substances pass much more readily from blood stream into the fluids of other tissues than they do into the brain and nervous system fluids, Dr. Robert D. Tschirgi of the University of California Medical Center reported at an American Chemical Society meeting in Madison, Wis.

The barrier itself, intended by nature to protect the brain and nerve centers, may be made up of two parts, the associate professor of physiology explained.

One part consists of the cells in the walls of the brain's blood capillaries that are so thickly arranged that they are more "leak-proof" than capillaries elsewhere.

The other part is in a special membrane of nerve cell material wrapped around the brain capillaries. Each part screens certain materials in the blood plasma.

In addition, electron micrographs of the cerebral cortex, brain covering, show there are no large-scale extra-cellular gaps or spaces. Therefore, this close packing of cells in the brain covering means that substances leaving the blood vessel compartment could do so only by entering these cells.

Thus far, this barrier can be broken down in animals only by means so drastic that they are fatal, Dr. Tschirgi said.

Various tissues of the body receive nourishment and dispose of waste matter through an interchange with the blood. In the case of the central nervous system the exchange process is slower and more selective than for most other tissues, the scientist explained.

Water moves freely between blood plasma and the central nervous system; sugars penetrate the brain slowly. Proteins rarely enter at all, while various other water-soluble substances differ in their rates of penetration but are slower than in other tissues, he concluded.

Science News Letter, July 12, 1958

MEDICINE

New "Light Up" Method Spots Contagious Disease

➤ A FLUORESCENT technique that promises to enable the physician to make an accurate diagnosis of certain communicable diseases within minutes after the patient enters his office has been developed.

This new diagnostic method uses a fluorescein dye to "light up" individual disease organisms.

The dye labels, or tags, the serum antibodies which are specific against a particular disease organism. Specimens from the patient are then stained with this tagged antibody solution.

If the specimen contains an infectious organism related to the tagged antibody, the organism will glow with a greenish light when observed through a microscope under ultraviolet light.

This technique may now make it possible to diagnose Group A streptococcal throat infections within a few minutes, instead of the usual three to five days required by conventional laboratory methods, Dr. Max Moody of the Communicable Disease Center, U. S. Public Health Service, pointed out.

This would permit the doctor to administer adequate treatment earlier in cases of Group A strep throat and thereby prevent many cases of rheumatic fever and kidney disease.

The fluorescent technique was also found beneficial in identifying specific bacteria which cause common dysentery, Dr. E. H. LaBrec, Walter Reed Army Institute of Research, reported to scientists attending the Society of American Bacteriologists meeting in Chicago.

Mrs. Berenice Thomason and co-workers at the U. S. Public Health Service Communicable Disease Center, applied the technique to identification of various Salmonella bacteria, such as the one which causes typhoid fever.

She emphasized that extreme caution must be exercised in the selection of testing solutions used in identifying these organisms, because of cross-reactions among the various groups of enteric bacteria.

Three other groups of scientists are also working on applications of the diagnostic technique.

Science News Letter, July 12, 1958

PHYSICS

"Liquid String" Study Aids Research on Fibers

➤ THE PROBLEM of how to tie a length of "liquid string" has been solved, a scientist at The Johns Hopkins University reports.

One result may be better nylon stockings, dacron shirts and orlon sweaters. Synthetic fibers are liquid plastic compounds that are formed into threads by drying thin streams of the liquid.

Dr. Jerome Gavis, assistant professor of chemical engineering, has set up a relatively simple laboratory apparatus that actually permits him to observe the tensions and other characteristics of a thin stream of liquid when it is "tied" at both ends.

The apparatus consists of a glass casing eight feet long and five inches in diameter, a slender steel nozzle and tube attached to a pressure system, an electromagnet that causes the flexible tube to vibrate at any given rate, and a camera equipped with high-speed electronic flash.

A heavy, viscous, or gooey, liquid, carboxymethyl-cellulose in water, is squirted out through the nozzle. Its action is stopped in mid-flight by using the camera's stroboscopic light.

So far experiments have shown that the liquid stream has some characteristics in common with a true string, such as a plucked violin string. It is composed of a variety of waves, has nodes and is affected by speed, the liquid's viscosity and the diameter of the nozzle opening.

While Dr. Gavin reports "We've barely begun to make headway with this project," results of the experiments may help to produce better synthetic fibers.

Manufacturers need better information on when the liquid stream used to make these fibers should be dried and how fast the drying should take place.

Science News Letter, July 12, 1958

BIOLOGY

Roosting Bats May Help Carve Out Caves

➤ ROOSTING bats may be an important factor in cave formation, particularly where the rock is soft.

The bats could wear away cavities in the soft walls as they jostle each other trying to secure preferred positions for roosting. Evidence for this was found in three bat-infested caves in Trinidad where W. A. King-Webster and J. S. Kenny of the fisheries department, Port-of-Spain, Trinidad, B.W.I., made their observations.

They measured numerous bell-shaped cavities in dry areas of the cave roof. During the day the upper part of these were lined with closely packed layers of sleeping bats. The lowest and oldest part of the cavities would have received the most wear from climbing bats, the scientists report, and could be expected to have a greater diameter.

Details of their study appear in *Nature* (June 28).

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TECHNOLOGY

Handiing "Hot" Material

The British have built a new high radioactivity handling building at Harwell where workers can test an amount of radioactivity equal to that of 112 pounds of radium in safety.

By A. W. HASLETT

➤ A TRAVELING electric crane and a self-propelling rail truck are part of the remotely controlled equipment used to handle bulky and highly radioactive materials in a new building lately completed at the United Kingdom Atomic Energy Authority's Research Establishment, Harwell, headquarters of Britain's research effort in atomic energy.

Such is the protection provided that components containing an amount of radioactivity equivalent to 112 pounds of radium can be put through engineering and other tests in complete safety to operators. With special arrangements, materials even more highly active can be dealt with at this High Activity Handling Building.

The building has become necessary for the design of safe and reliable British nuclear reactors of more advanced types than those already in service.

To insure reliable operation, it is essential to test all components in conditions which mimic as closely as possible those of the final reactor. That means in an experimental reactor built for the job. There is no other way of reproducing the effects produced in materials by heavy exposure to neutrons at high temperatures.

Materials Testing

One effect, the one that interests design engineers, is to knock the structure of the material about. Another is to make it highly radioactive. The more advanced in type the final reactor, the greater is the neutron irradiation that will be encountered. The more important, therefore, are tests of components. The difficulty of making them is also greater.

Any reasonable combination of conditions can be reproduced at will in Harwell's two materials-testing reactors, "Dido" and "Pluto."

The new building provides the other half of the facilities needed: means for safe examination and testing after exposure. It has been built with an eye to the future. There are facilities for every method of examination, physical and mechanical, that have so far been found useful, and there is provision, so far as possible, for the adoption of new methods.

Components which have been exposed in the materials-testing reactors are conveyed in lead-shielded containers to the high activity building. Still in their containers, they are lifted by a 25-ton hoist at the entrance to the building. Specimens can be up to 12 feet long by 12 inches wide without need for special arrangements. If necessary, more bulky components can be handled.

Examinations are carried out by remote control in cells protected by concrete walls five feet six inches thick. There are five of these cells, each eight feet wide, ten feet six inches deep, and 16 feet six inches high. Between adjoining cells, there are removable shielding doors of about 30 tons weight.

Master Controls

Removal of these doors gives access to the traveling crane, which has a lift of one and one-half tons and serves all cells, and to a self-propelling trolley which can support more than three times this weight. To maneuver heavy components on arrival, there is a power manipulator. This is a device with a mechanical arm and hand, operated from a box carried on an overhead railway. Like all other equipment serving the cells, this is controlled from outside.

Each cell has an observation window. These are not mere peep-holes; they measure five feet by three feet and are the same thickness as the cell walls, to provide protection for operators.

NUCLEAR WORLD—A maintenance operator clad in protective clothing works nuclear tools at the new British plant for handling highly radioactive materials. The High Activity Handling Building is set up to handle test components with a radioactivity equal to that of 112 pounds of radium safely. It is at the United Kingdom Atomic Energy Authority's Research Establishment, Harwell, England.

After a component for examination has been placed in the required position, further operations are carried out by master-slave manipulators. These, again, are like mechanical hands, controlled from outside the cells. Operations which can be carried out include rough and fine machining, physical inspection before or after machining, and tests of mechanical properties.

In this way, changes in microscopic structure brought about by increasing exposure times can be followed and correlated with changes in strength and other properties.

Such tests are important, among other purposes, in the development of canning materials. They give information not only on the suitability of particular materials, but on the probable running costs of the final reactor. The time that fuel elements, for example, can be kept in service is a key factor in determining costs. In this way, they contribute to the data needed to compare the economics of one type of reactor with another—although neither may yet have been built or decided on.

Such a building must be used to the full if the cost of construction is to be justified.

The whole plant has been designed so that every operation needed can be done quickly. For the same reason, care has been taken to provide for easy maintenance, and for quick decontamination of the examination cells when necessary.

Contamination-Free Work

On the far side of the cells from the operators, there is a connected maintenance area equipped for operation by frogmen-suited maintenance workers. They can replace one unit by another without danger from radioactive dust in the cell. Finally, the ventilation system and air pressures are so arranged as to prevent contamination of the servicing and operating areas by air movement from the cells.

Science News Letter, July 12, 1958

TECHNOLOGY

"Hi-Fi" Food Preserver Built for Army

➤ A "HI-FI" atomic food preserver will be built for the U. S. Army, the Atomic Energy Commission reported. A company will be awarded a contract to design, build and test a High Intensity Food Irradiator to be known as "HI-FI." It will be a cobalt-60 gamma food irradiator utilizing an amount of radioactive cobalt greater than all the cobalt-60 now in use in the country. The "HI-FI" will be used by the Quartermaster Corps for its food preservation program at the Army's Ionizing Radiation Center, Lathrop, Calif.

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GEOPHYSICS

Tally Antarctic Studies

See Front Cover

▶ ROSS ICE SHELF in the Antarctic, which is about 1,000 feet thick and about as large as France, floats on water that is more than 2,000 feet deep.

This is one of the findings made by American scientists in the Antarctic during the International Geophysical Year which marked its first anniversary on July 1.

Highlights of U. S. activities at the U. S.-IGY Antarctic stations were reported in Washington and in Moscow. They were prepared for the Russian newspaper Izvestia which made a specific request for information about this country's Antarctic research program during the past year.

Scientists at the six U. S. Antarctic stations reported the following:

1. The low temperature of 102.4 degrees below zero Fahrenheit was recorded on Sept. 17, 1957, at the Amundsen-Scott South Pole Station at the very bottom of the world. Scientific personnel at the Station were the first ever to winter over in the continent's interior.

2. A new Antarctic mountain range with peaks of 9,000 feet and large ice-free areas, one of which contained a fresh-water lake with plant life, were discovered by scientists at the Ellsworth Station.

3. Wind velocities up to 133 miles per hour during an April storm that blew away anemometers were recorded at the Wilkes Station.

4. The floating Ross Ice Shelf was discovered by personnel at the largest Antarctic Station, Little America. Scientists also found that ice temperatures 30 feet below the surface at Little America were slightly warmer than at the surface because of the influence of ocean heat.

5. Ice 14,000 feet thick and resting on a rock bed 8,200 feet below sea level was found by Byrd Station scientists. It may be the thickest ice layer measured anywhere in the world. Byrd Station investigators also think they sit on a frozen inland sea or fiord.

6. Interesting correlations between auroral and ionospheric phenomena have been found at the Hallett Station, manned jointly by the U. S. and New Zealand scientists.

The photograph on the cover of this week's SCIENCE NEWS LETTER is a view upward from the bottom of a crevasse taken during IGY studies in the Antarctic. The glaciologist descends by rope to study ice at depths not otherwise attainable and returns by cable ladder. The snow bridge, sometimes many feet thick, over the crevasse has been broken open.

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Salk *vaccine* preparation involves growing the virus in tissue cells of monkeys' kidneys, harvesting a liquid containing the virus, filtering and storing the liquid under refrigeration at five degrees centigrade.

HANDS-OFF HELICOPTER—A helicopter is precisely stabilized during a "hands-off" flight (note pilot) as a result of an automatic flight control system developed by the Sperry Gyroscope Company, Great Neck, N. Y. Complete four-axis control, pitch, roll, heading and altitude, is provided in the system which takes its commands directly from the pilot's controls. Electronic trimming, automatic turn coordination and push-button controls for precise attitude adjustment are among the system's automatic features.

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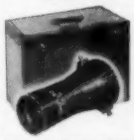

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• Books of the Week •

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ADMINISTRATION OF SALARIES FOR ENGINEERS AND SCIENTISTS—John W. Riegel—*Univ. of Mich. Press*, 116 p., paper, $3.50. Based on interviews conducted in eight manufacturing companies and two public utilities.

AN EVENING IN SAPSUCKER WOODS—P. P. Kellogg, producer—*Cornell Univ. Records*, $4.95. A delightful record for the beginning and advanced bird watcher giving 32 identified bird calls along with many other woodland sounds.

BELOW THE SURFACE—Compiled by Alice Isabel Hazeltine—*Abingdon*, 223 p., illus., $3.95. For the teen-ager. Biographical accounts of exploits below the surface of earth's land and water.

CELLULOSICS—Walter D. Paist—*Reinhold*, 270 p., illus., $5.75. On the chemistry, properties and fabrication methods of cellulosics with examples of their applications.

CHEMISORPTION OF NITROGEN ON NICKEL CATALYSTS—R. J. Kokes and P. H. Emmett—*Mellon Institute*, 5 p., paper, free upon request direct to publisher, 4400 Fifth Ave., Pittsburgh 13, Pa.

CHEMISTRY—James V. Quagliano—*Prentice-Hall*, 877 p., illus., $6.95. For the beginning college student.

CHEMISTRY: Man's Servant—Leonard J. Fliedner and Louis Teichman—*Allyn*, 625 p., illus., $4.96. A textbook for high school students.

CONCISE OXFORD ATLAS—D. P. Bickmore, Ed. and T. K. Derry—*Oxford Univ. Press*, 2nd ed., 288 p., $5.75. The British Isles and the rest of the world, includes climatics, statistics and historical information.

DICTIONARY OF PHYSICS AND ALLIED SCIENCES, Vol. I: German-English—Charles J. Hyman, Ed.—*Ungar*, 671 p., $9. The first dictionary of its kind, contains also the principal terms of astronomy, chemistry, mineralogy and geophysics, as well as, electronics, television, navigation.

ELEMENTARY NUCLEAR PHYSICS—W. K. Mansfield—*Temple Press (Simmons-Boardman)*, 60 p., illus., paper, $2.75. Nuclear engineering monograph based on lectures given to British undergraduate students.

EVOLUTION BY NATURAL SELECTION—Charles Darwin and Alfred Russel Wallace, foreword by Sir Gavin de Beer—*Cambridge Univ. Press* for XV International Congress of Zoology and the Linnean Society of London, 288 p., $4.75. A centenary commemorative volume.

FM RADIO SERVICING HANDBOOK—Gordon J. King—*Macmillan*, 192 p., illus., $5. For the amateur enthusiast as well as for the professional service engineer.

FLUOROCARBONS — Merritt Allen Rudner — *Reinhold*, 238 p., illus., $5.75. Covers properties, chemistry, processing and fabrication techniques, and final applications of fluorocarbons.

FOUNDATIONS OF EMBRYOLOGY—Bradley M. Patten—*McGraw-Hill*, 578 p., illus., $10.50. For advanced work in comparative or experimental embryology for zoology majors, or human embryology for medical students.

FROM KITE TO KITTY HAWK—Richard W. Bishop—*Crowell*, 211 p., illus., $3.00. The story of the pioneers of flight with a simple and vivid explanation of the principles involved in each step toward Kitty Hawk.

HAWAIIAN FLOWERS & FLOWERING TREES—Loraine E. Kuck and Richard C. Tongg—*Tuttle*, 158 p., illus. in color, $7.50. A guide to over 140 tropical and semitropical flowering plants.

HERE COME THE BEAVERS—Alice E. Goudey—*Scribner*, 94 p., drawings by Garry MacKenzie, $2.50. Nature story book for young children.

HERE COME THE SEALS—Alice E. Goudey—*Scribner*, 93 p., illus. with drawings by Garry MacKenzie, $2.50. Life story of the fur seal and harp seal told for young children.

HIGH QUALITY SOUND REPRODUCTION—James Moir—*Macmillan*, 591 p., illus., plates, $14. Comprehensive work for those interested in the problem of reproducing sound with a high degree of fidelity.

HIGHER EDUCATION IN TRANSITION: An American History, 1636-1956—John S. Brubacher and Willis Rudy—*Harper*, 494 p., $7.50. Beginning with the colonial colleges, the authors follow the changes wrought in the structure and curricula of American colleges and universities.

INTANGIBLE REWARDS FOR ENGINEERS AND SCIENTISTS—John W. Riegel—*Univ. of Mich.*, 84 p., paper, $2.50. Based on interviews with executives, supervisors and employees.

INTRODUCTION TO THE MOON — Dinsmore Alter—*Griffith Observatory*, 108 p., illus. with photos, $1.65. Gives a general knowldge of the lunar surface, omitting technical and mathematical details.

MANUAL OF SCIENTIFIC RUSSIAN—Thomas F. Magner—*Burgess*, 103 p., paper, $4.60; loose-leaf punched for three ring notebook, $4. The written language, rather than the spoken idiom, is the main object of this manual.

A MANUAL ON CARDIAC RESUSCITATION—Robert M. Hosler—*Thomas, C. C.*—2nd ed., 208 p., illus., $5.50. Presents the problems and step-by-step procedures to follow in saving human lives.

MINERALS YEARBOOK 1955, Vol. III: Area Reports—Bureau of Mines field staff—*Govt. Printing Office*, 1220 p., $4. Record of performance of the Nation's mineral industry, covering the 48 states.

A MODERN APPROACH TO ORGANIC CHEMISTRY —J. Packer and J. Vaughan—*Oxford Univ. Press*, 980 p., $13.45. For undergraduate students, presenting organic chemistry as a rational structure.

NUCLEAR QUADRUPOLE RESONANCE SPECTROSCOPY, Supplement 1 to SOLID STATE PHYSICS—T. P. Das and E. L. Hahn—*Academic*, 223 p., $7. Special branch of radiofrequency resonance physics used as an analytical tool for solid state studies and structural chemistry.

NUCLEAR REACTOR THEORY—J. J. Syrett—*Temple Press (Simmons-Boardman)*, 80 p., illus., bibliography, paper, $2.95. A general introduction to the physics of reactor design.

ORBITAL RESULTS FOR SATELLITE 1957 BETA ONE—Luigi G. Jacchia—*Smithsonian Institution Astrophysical Observatory*, Special Report No. 13, 8 p., paper, free upon request direct to publisher, Cambridge 38, Mass.

OTTO RANK: A Biographical Study Based on Notebooks, Letters, Collected Writings, Therapeutic Achievements and Personal Associations—Jessie Taft—*Julian Press*, 299 p., illus., $6.50. A close associate of Sigmund Freud during the years 1905-1906.

OUR WORLD—E. Joseph Dreany—*Maxton*, 30 p., illus., 69¢. For young children.

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NUCLEAR ENERGY *by Alexander Efron, E.E., Ph.D.*
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THE PHYSICAL WORLD—Richard Brinckerhoff and others—*Harcourt,* 450 p., illus., $4.88. A high school general science text requiring only simple mathematics.

POCKET FIELD GUIDE TO TREES—William Carey Grimm—*Stackpole,* 143 p., illus. with drawings by author, paper, $1.50. Facilitates familiarity with deciduous trees and conifers.

POCKET PHOTO DATA BOOK—*Morgan & Morgan,* 160 p., charts, $3.95. Provides a distillation of the data most used and wanted by working photographers in a handy 6-ring loose-leaf binder.

A PUPPY NAMED GIH—Sara Machetanz—*Scribner,* 30 p., illus. with drawings by Fred Machetanz, $2.75. For the very young reader, the story of the training of a team of sled dogs in Alaska.

REACTOR HEAT TRANSFER—W. B. Hall—*Temple Press (Simmons-Boardman),* 68 p., illus., bibliography, paper, $2.75. British monograph, for engineers and physicists in nuclear engineering.

REINFELD ON THE END-GAME IN CHESS—Fred Reinfeld—*Dover,* 176 p., paper, $1.25. First published in 1940 under the title "Practical End-Game Play."

RESEARCH IN ION EXCHANGE CHROMATOGRAPHY: Transactions of the Session on Applications of Ion Exchange Chromatography in Medicine and the Food Industries, U.S.S.R. Academy of Sciences—V. V. Rachinsky and others, in English translation—*Consultants Bureau,* 180 p., paper, $35.

SATELLITES, ROCKETS AND OUTER SPACE—Willy Ley—*New Am. Lib.,* 128 p., illus., paper, 35¢. Survey of rocket development and space travel prospects.

SCIENCE AND FOREIGN POLICY—Robert E. Marshak and others—*Foreign Policy Assn.,* Headline Series No. 130, 62 p., illus., paper, 25¢. Includes discussion of rocketry and earth satellites.

SCIENCE NEWS 48—Archie and Nan Clow, Eds.—*Penguin,* 136 p., illus., paper, $.65. A rocket and satellite research number, interesting to anyone who wants an understanding of the background to space travel.

THE SEA AND ITS MYSTERIES—William M. Hutchinson—*Maxton,* 30 p., illus., 69¢. For young children.

SELECTED SCIENCE BOOKS FOR SECONDARY SCHOOLS (A Bibliography)—Compiled by R. Vincent Cash and others—*Conn. Science Teachers Assn.,* 116 p., paper, 25¢. About 500 annotated titles listed alphabetically by authors, indexed by subject and by titles.

TEN YEARS WITH TELEVISION AT JOHNS HOPKINS—Leo Geier—*Johns Hopkins University,* 66 p., illus., paper, free upon request direct to publisher, Director of Public Relations, Baltimore 18, Md. The pioneering story of educational TV called The Johns Hopkins Science Review.

THE TREASURY OF GAMES AND PUZZLES—Compiled by Carlton Wallace—*Philosophical Lib.,* 256 p., illus., $6. Secret codes, brain twisters, pencil and paper games, optical illusions and party games.

TWENTY THOUSAND NURSES TELL THEIR STORY—Everett C. Hughes, Helen MacGill Hughes and Irwin Deutscher, Foreword by Agnes Ohlson—*Lippincott,* 280 p., $5.75. Findings of a five-year program of research in nursing functions.

WHAT FLOWERING TREE IS THAT? A Handbook for the Tropics—Edwin A. Menninger—*Menninger,* 183 p., photographs, 6 color plates, cloth, $4, paper without color plates $2.50. Describes hundreds of exotic flowering trees found in Florida.

YOUR OPERATION—Robert M. Cunningham, Jr.—*Public Affairs Comimttee,* Pamphlet No. 267, 20 p., illus., paper, 25¢. Advice and reassurance to persons facing surgery.

TECHNLOGY

Office Digital Computer Sends Data by Teletype

➤ AN ELECTRONIC digital computer, designed especially for office bookkeeping purposes, was introduced at the Second Annual Military Electronics Conference meeting in Washington, D. C.

The machine, called Cal-Key by its developer, Van Norman Industries of Manchester, N. H., is an electro-mechanical digital computer, and has the 11-column keyboard of the ordinary comptometer calculator.

While operation of the computer portion of the equipment is electronic, the results of any operation are automatically "read out" and mechanically punched on paper teletype tape in the standard five-hole code.

The manager of a chain-store, for example, can calculate the day's business, and instantly send the results by teletype to the home office in a distant city. There the results can either be received by conventional methods, or automatically recorded in a punched-card system for tabulation.

PUBLIC HEALTH

Suggest Goals For Care of Aged

➤ EXPANSION of health care facilities tailored to the specific needs of the nation's more than 14,000,000 aged, regardless of their economic status, is one of the goals of a new comprehensive health program.

Other problems of the aged that the Joint Council to Improve the Health Care of the Aged will study include increased opportunities for older people to obtain voluntary health insurance coverage, and more community health services.

Work projects which the Council has already taken an active part in are:

1. A conference on the care of patients with long-term illnesses.

2. Preparation of upgraded standards for nursing homes which will eventually lead to improved nursing home care for the aged.

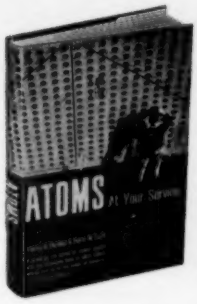
3. A project to reduce the financial burden of a disabling illness among the elderly by performing the necessary household tasks to enable them to remain at home, with qualified nursing and medical attendance in the home.

4. Six regional conferences have been held to help doctors cope with the problems of the aged. A national conference will be held in September.

The four sponsors of the Joint Council are the American Dental Association, American Hospital Association, American Medical Association and the American Nursing Home Association.

The Joint Council has emphasized the need for state and local governments to assume their proper responsibility to aged patients by providing realistic financial support for medical, dental, hospital and nursing home care for those who are unable to pay, Dr. Edwin L. Crosby, director of the American Hospital Association and interim secretary of the Council, has said.

How atomic researchers are working to improve commerce, industry, and the general welfare



ATOMS

At Your Service

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This book charts for the general reader the progress, scope, and direction of beneficial atomic research, and the momentous plans now on drawing boards or undergoing actual test—the sources of atomic energy, the development and use of various kinds of reactors, what science has learned of safe ways of living with the atom, the role of atomic energy in such fields as mining, agriculture, transportation, power, and medicine.

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ENGINEERING

Inefficient Power Sources Competitive for Missiles

➤ STRANGE NEW SOURCES of electrical power, low in efficiency but also favorably low in weight, may replace more efficient batteries and generators in guided missiles.

Although possessing very low efficiency, such futuristic power supplies as solar cells, fuel cells and thermoelectric generators have a considerable weight advantage over present power, Henry Oman, Boeing Airplane Company, Seattle, Wash., told a meeting of the American Institute of Electrical Engineers in Buffalo, N. Y.

Electricity generated by the action of sunlight on photosensitive chemicals (solar cell); by the chemical reaction between mixed gases (fuel cell); or heating a metal element (thermoelectric generator) is sufficient to drive the tiny motors, operate instruments and actuate computers that make up the guidance system of a missile.

Such unconventional power supplies may also offer higher reliability because of the absence of moving parts, Mr. Oman said.

Science News Letter, July 12, 1958

Questions

ASTRONOMY—How long does a granule live, on the average? p. 25.

ENGINEERING—What is the principal advantage of the "free piston gasifier"? p. 22.

OCEANOGRAPHY—Where is the new ocean current located? p. 24.

PHYSICS—What special properties of helium interest physicists? p. 19.

Photographs: Cover, National Academy of Sciences-IGY Photo; p. 19, General Electric Company; p. 21, Wonder Building Corporation of America; p. 23, Raytheon Manufacturing Company; p. 26, British Information Services; p. 27, Sperry Gyroscope Company; p. 32, Eastman Chemical Products, Inc.

Do You Know?

A new drug in capsule form, taken orally a couple of hours before exposure to the sun, will permit anyone even with the fairest and tenderest skin to acquire *tan*.

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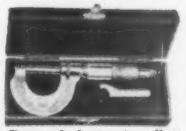

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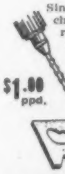

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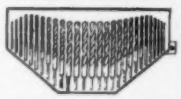
Chrome Vanadium 29 Pc. DRILL SET



Specially made for speed drilling. In sturdy plastic tool roll. Finest alloy steel drills hardened and precision ground to the sharpest, longest lasting cutting edge obtainable; will easily and clearly bite through hardwoods, plastics, aluminum, iron and toughest steels. Unconditionally guaranteed for thousands of drillings. Full jobber length. Sizes by 64th from 1/16" to ½". There are only a limited quantity of sets available at this low price, so hurry! $6.49 ppd.
Also available with Turned Down Shanks to fit all ¼" drills. In individual pocket roll. $8.95 ppd.

60 Pc. Set Wire Gauge CHROME
VANADIUM DRILLS

Top quality high test Chrome Vanadium Drills designed for speed drilling through toughest steels, woods, plastic, iron and aluminum. Precision ground, long-lasting cutting edges.

Guaranteed to give years of satisfaction. A full 60 pc. set. Nos. 1 through 60.
A $14.95 value
NOW ONLY ..... $5.40 plus 25¢ pp. & hdlg.
Same set above with Index Container—Only ..... $6.65 plus 35¢ pp. & hdlg.
Also available 61-80 set of high quality drills in plastic kit with marked pocket for each drill—ONLY $2.50
plus 35¢ pp. & hdlg.

Extra Heavy—.006 Gauge
BLACK PLASTIC TARPAULINS
Waterproof, Resistant to Dust, Air, Grease, Unaffected by Heat or Cold

Covers and protects hundreds of items in and around the Home, Cottage and Farm. Lightweight for easy handling by one man yet strong enough to withstand the roughest handling. Solid Brass grommets every 18" for easy and secure tie-down. Use OUTDOORS as Frost Cover; Cordwood Cover; Cold Frame for shrubs, trees, plants; Mulching; Auto, Boat or Private Plane Cover; Wind Break; Temporary Shelter; Silage Cover; Hay and Straw Stack Cover. Use INDOORS as Machinery Cover; Mechanic's Tarp; Drop Cloth; Building Material Cover; Temporary Window; Merchandise Cover; Woolen Storage; Porch Protection; Picnic Cloth; Play Pen Pad, etc.

6'x9'	$ 4.99	20'x20'	$21.50
9'x12'	7.50	20'x30'	31.50
20'x10'	12.50	Prices include postage.	

All Purpose, Heavy Steel
TOTE-ABOUT

$1.98
plus 35¢ PP. & Hdlg.

This attractively styled Tote-About, measuring 16"x5½"x7", is ideally suited for household or garden tools, hobby craft and art supplies, children's toys and many other indoor & outdoor applications! Constructed of heavy-duty steel with baked-on metallic finish. No sharp or rough ends. Adjustable handles with slot for saw. 2 dividers on tray handle holds nails, screws, bolts, etc. Easily assembled in just 5 minutes.

Bigger drills at low, low prices!
4 Pc HIGH CHROME
SPEED SET

Another of Scott Mitchell's famous tool bargains! The original $42.50 price is right on the package, but you pay only $9.95! A wonderful buy for advanced hobbyists, carpenters, construction workers, factories, machine shops! Made of high quality, specially hardened steel, with turned down shanks to fit all ¼" electric drills. Zip through hardwoods, aluminum, iron, plastics, even the toughest steel! Sizes 5/8", ¾", 7/8", 1". Come in numbered pocket, snap closure tool roll.

Reg. $42.50
NOW $9.95
plus 50¢ pp., hdlg.

Extra Special! 11 Pc. Set. Reg. $99.50. NOW ONLY $29.95 plus $1 pp., hdlg. Same features as 4 pc. set. Sizes 9/16", ⅝", 11/16", ¾", 13/16", ⅞", 15/16", 1", 1⅛", 1 3/16", 1¼".

AUTOMATIC SIPHON PUMP

Now-siphon any liquid automatically, safely, without putting tube to mouth! Squeeze bulb of this all new type siphon, liquid starts to flow immediately! Transparent valves let you see liquid flowing! Siphons, pumps gasoline, water, any liquid. Even acids, corrosives! For cars, boats, power mowers; campers, plumbers, doctors, chemists, factories!

Acid resistant. Over 7 ft. long overall! Sold with a money back guarantee. Price $1.98 postpaid.

Flexible Steel
POCKET SAW
Cuts in Every Direction

Made of super quality silicon steel, the exclusive interwoven blades cut quickly, easily yet never clog. Ideal for hobbyists, scouts, outdoor sportsmen, gardeners, farmers, campers, etc. to cut wood, formica, rubber, cork, plastics, ice, non-ferrous metals and most anything else . . . in any direction! Cutting teeth guaranteed not to wear. Rust resistant. Easily rolls up for carrying in plastic pocket-pac. Weighs less than a pack of cigarettes. Imported from France; used by French Military and British Commandos.

SPORTSMAN—20"—.063 dia.—98¢ ppd.
WOODSMAN—20"—.095 dia.—$1.49 ppd.
COMMANDO—33"—.095 dia.—$1.98 ppd.

Hobbyist, Handyman, Housewife, Gardener
SQUEEZ-CLIP KIT
Fixes or Fastens easier, faster, stronger than a stitch, staple, screw, nail or tie.

The Squeez-Clip Kit can do so many things, you'll wonder how you ever did without it! You get a special pliers with indented slots in the jaws plus 500 assorted size galvanized, rust-resist clips. The clips, shaped like a staple, fit into the pliers. Then, just squeeze lightly and you've got a streamlined, triangular ring of a thousand uses. Use to install auto seat covers, repairs screen, tarps, belts, straps, attach vines and plants to stakes and trellises, clip papers, join lengths of rope, etc. An invaluable aid to home & industry.

Only $1.98 plus 35¢ pp. & hdlg.

Surgical Steel — Hand Ground
Set of 12
CARVING KNIVES
$2.00 ppd.

The sharpest, keenest ground, surgical steel blades we have ever seen—sharp enough to split a human hair in two! 12 different shapes and edges can do every job of wood carving, model making, linoleum cutting, scratching and whittling imaginable. Each blade has a 4½" long hardwood handle for easy gripping . . . heavy duty blade is firmly attached by means of a brass ferrule to insure long, continued rugged use. Each surgical steel blade precision hand ground to easily and quickly notch and cut any shape you wish. A sensational all-purpose set, well worth $5.95.

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Order Today and Save. Minimum order $1.00. Send Check or M.O. C.O.D. orders plus fee. Money Back Guarantee. Protects you against risk.

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❁ *STONE FACING is only one-thirtieth the weight of actual stone. It is made of glass-fiber-reinforced plastic. Available in panels 48½ inches wide by 12½ inches high, the stone veneer can be nailed on interiors or exteriors.*

Science News Letter, July 12, 1958

❁ *PICNIC PACKAGE eliminates the need for a half dozen assorted containers. The package is made up of five aluminum pans that fit together in a single insulated carrying case. Foods may be packed either hot or cold. The pans can also be used for warming or cooking.*

Science News Letter, July 12, 1958

❁ *BELT SANDER offers the do-it-yourselfer a 1,100 feet per minute high speed for rough lumber and 800 f.p.m. for finishing. A plastic handle and grip knob keep cool during the sanding. The tool holds a four-inch sanding belt.*

Science News Letter, July 12, 1958

❁ *FISHERMEN'S LURES have a mouthpiece that causes a vibrating motion in the water. Jointed in structure, the lures, shown in the photograph, are molded of a butyrate*

plastic. Available in three designs with different colorations and finishes, the lures are sinkers. They run deep when reeled slowly and medium deep on faster retrieve.

Science News Letter, July 12, 1958

❁ *AUTOMATIC TARGET resets itself when hit. Made of steel, the target is mounted on 18-inch steel rods for insertion into the ground. It has a flat surface to restrict ricochet. The overall height can be adjusted from eight to 22 inches.*

Science News Letter, July 12, 1958

❁ *TWO-DIMENSIONAL PLANETARIUM is designed for educational purposes and persons of all ages interested in astronomy. It consists of a number of plastic and cardboard charts and movable pieces for assembly, including a solar system positioner, star charts, horizon indicators and a manual.*

Science News Letter, July 12, 1958

❁ *BICYCLE STABILIZER can be mounted in minutes and adjusts to any height. The six-inch wheels are 21 inches apart. They are attached to the bicycle frame with two self-locking brackets at the axle nut.*

Science News Letter, July 12, 1958

❁ *WIND INDICATOR consists of a small wind vane, 50 feet of lead-in cable, and an indoor dial. Eight points of wind direction are indicated on the dial. The vane flashes the wind direction indoors by lighting the compass points on the etched and spun brass dial.*

Science News Letter, July 12, 1958

Nature Ramblings

By BENITA TALL

➤ IT IS the time of year for the young Baltimore orioles to leave their nests. A human observer must sometimes wonder if the fledgling fully appreciated his first home, as nice a piece of construction engineering as any man could build.

Bird experts agree that the Baltimore oriole is probably the best artisan and architect of North American birds. In fact, its nest building goes beyond skilled craftsmanship into the field of construction engineering.

How the bird builds or rather weaves the long pocket-shaped nest is an amazing thing to see.

The first strands, usually long ones, are loosely wound around a selected twig. Each additional fiber the oriole brings to the growing nest is worked into the "fabric" by shuttle-like movements of the bill.

Master Builder

As the work progresses and the hanging mass of plant fibers, milkweed silk and sometimes string, horsehair and bits of cloth takes shape, the tempo of these shuttle movements increases greatly. Ornithologists have counted more than 100 of the thrust and draw motions made at a single visit to the nest.

It takes two or three days before one side of the nest is completed. Many long strands of the plant fibers dangle at the ends.

At this point the bird begins work from what will be the inside of the nest. At each visit to the nest she—it is the female who is design and construction engineer here—not only weaves in new strands but also gathers up many others still hanging free.

More twigs are used to support the other side of the nest; more weaving with the typical random stitching motions of her beak follow.

Finally a soft lining of hair, wool or fine grasses is molded to shape.

The oriole settles down in the nest and shakes all over in order to bring the pressure of her breast to bear down on the nest's inner surface.

The result: A nest that will outlast many wind and rain storms, yet will probably be "home" for a Baltimore oriole family for several weeks.

Science News Letter, July 12, 1958